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**A Quarterly Bulletin of the Pacific El Niño/Southern Oscillation Applications Climate (PEAC) Center
Providing Information on Climate Variability for the U.S.-Affiliated Pacific Islands**

<http://www.prh.noaa.gov/peac>

CURRENT CONDITIONS

The climate of the tropical Pacific was ENSO-neutral throughout 2013, with all ENSO core regions remaining just slightly on the cold side of average. The tropical Pacific wind field continued to exhibit some behaviors typical of La Niña including enhanced easterly winds at low latitudes in the western Pacific, weak and/or absent monsoon, and persistent westward shift of tropical cyclone activity. However, for a brief period during mid-September through early November, there was a strong burst of tropical cyclone activity in the western North Pacific basin. Seven typhoons, a new monthly record, formed in the basin during October 2013, with some of these affecting the islands of Micronesia. During the first week of November, the final typhoon of 2013, Super Typhoon Haiyan, formed at low latitudes south of Pohnpei Island. This cyclone became a tropical storm within Chuuk State, passed directly over Kayengal (an outer island of the Republic of Palau) at super typhoon intensity, and later made landfall near the city of Tacloban in the central portion of the Philippine Archipelago. Haiyan was possibly one of the most intense typhoons to ever make landfall. After Haiyan, the climate of the tropical Pacific became abruptly quiet, with a return of low-latitude easterly wind anomalies, accompanied by the early onset of dry conditions at most islands.

Only a very few locations had surplus rainfall during 2013. At Pago Pago, the 2013 annual rainfall was slightly above normal with 106%. Similarly, Peleliu (Republic of Palau), rainfall was also 106% of the annual average. An extreme rainfall event in mid-September single-handedly pushed the WFO Guam 2013 annual rainfall past its annual average. At Kapingamarangi and Nukuoro (atolls near the equator south of Pohnpei Island), the annual surplus was greatest, with each of these atolls receiving over 120% of average annual rainfall.

Dry conditions have persisted into January 2014, and there is now worry of a possible recurrence of drought in the northern atolls of the Republic of the Marshall Islands (RMI), ranging from Majuro northward through Kwajalein, Utirik, and Wotje. It was only just a year ago that a very severe drought began to affect the atolls of Utirik and Wotje. The dry season throughout most of Micronesia is now well underway. See the Local Variability Summaries for more details on the climate and weather of each island group.

TROPICAL CYCLONE

The PEAC archives western North Pacific tropical cyclone numbers, track coordinates, and 1-minute average maximum sustained wind taken from operational warnings issued by the Joint Typhoon Warning Center (JTWC) of the U. S. Air Force and Navy, located at Pearl Harbor, Hawaii. Western North Pacific tropical cyclone names are obtained from warnings issued by the Japan Meteorological Agency (JMA), which is the World Meteorological Organization's Regional Specialized Meteorological Center (RSMC) for the western North Pacific basin. The PEAC archives South Pacific tropical cyclone names, track coordinates, central pressure, and 10-minute average maximum sustained wind estimates from advisories issued by the Tropical Cyclone Warning Centers at Brisbane, Nadi, and Wellington. The numbering scheme and the 1-minute average maximum sustained wind estimates are taken from warnings issued by the JTWC. There are sometimes differences in the statistics (e.g., storm maximum intensity) for a given tropical cyclone among the agencies that are noted in this summary.

Tropical Cyclone Summary

During the calendar year 2013, the JTWC numbered 33 significant tropical cyclones. The intensity distribution of these included 12 typhoons, 16 tropical storms and 5 tropical depressions. This distribution of tropical cyclones is near normal for the total count of all cyclones (33 versus the average of 31), but below normal for the count of typhoons (12 versus the average of 18). Of the 12 typhoons, 5 of them became super typhoons with peak sustained wind intensities of 130kts or higher. The 2013 typhoon season was for relatively quiet conditions, with cyclone formation once again displaced to the west and north of normal. However, during mid-September through early November, there was a spectacular burst of cyclone activity; with a record number of 7 typhoons forming during the month of October. The JTWC numbered 15 significant tropical cyclones during this amazing burst of activity. The great boreal fall 2013 surge in cyclone activity was capped during the first week of November by the formation of the most intense and destructive typhoon of the year: Super Typhoon Haiyan. Super Typhoon Haiyan will be discussed in a later section.

In mid-January 2014, a weak tropical cyclone was affecting the southern region of the Republic of the Philippines with

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heavy rains. In the Southern Hemisphere, Cyclone Ian weakened after moving out of the South Pacific tropics where it severely impacted the Kingdom of Tonga. American Samoa was spared any effects of this cyclone, but the accompanying northwest monsoon provided them with heavy rainfall.

The 2013 eastern North Pacific hurricane season ended with an above normal number of named storms (18 versus the average of 16). The number of cyclones reaching hurricane intensity was below normal (7 versus the average 8). Late in the season, Hurricane Raymond became the only major hurricane in the basin for the year. Three of the season's cyclones: Flossie (06E), Gil (07W) and Heriette (08E) crossed the 140°W meridian and entered Hawaii's Central Pacific Hurricane Center's (CPHC) area of responsibility. Flossie actually crossed the island chain as a tropical storm causing power outages and localized flooding. During mid-August 2013, 3 tropical cyclones formed in quick succession in the central North Pacific and were numbered and named by the CPHC: Pewa (01C), Unala (02C) and Tropical Depression 03C. Isolated far at sea, these cyclones caused no reported damage or injury.

The Southern Hemisphere cyclone season of 2013-2014 has evolved in a near average way so far, with a total of 8 cyclones, numbered by the JTWC. There has been a westward bias to the cyclone activity with 7 of the 8 cyclones located in the southern Indian Ocean basin, and only 1, Cyclone Ian (TC08P) affecting the South Pacific. Cyclone Ian became very intense (125kts winds) and adversely affected the kingdom of Tonga on 11 January, 2014. This report from BBC News summarizes the disaster there:

"Homes have been flattened and trees uprooted in the South Pacific kingdom of Tonga after it was hit by one of the most powerful storms on record. Cyclone Ian battered the central Ha'apai islands, home to 8,000 people, over the weekend, packing gusts of up to 287km/h (178mph). It was a 'miracle' only one 51-year-old woman lost her life, said emergencies director Leveni Aho. ..."

Further north, in American Samoa, the surge in the northwest monsoon accompanying the southward moving TC Ian, provided a period of heavy rainfall.

PEAC Center Tropical Cyclone Outlook

Three organizations¹ produce seasonal outlooks for tropical cyclone activity in the western North Pacific that are routinely used by the PEAC Center for guidance on the upcoming typhoon season: (1) The Guam Weather Forecast Office (WFO), (2) The City University of Hong Kong Laboratory for Atmospheric Research, and (3) The Benfield Hazard Research Centre Tropical Storm Risk (TSR) research group¹. At the time of this writing, no seasonal outlook for western North Pacific typhoon activity had been issued.

Both the New Zealand National Institute of Water and Atmospheric Research (<http://www.niwa.co.nz/our-science/climate/news>) and the Australian Bureau of Meteorology ([http://](http://www.bom.gov.au/climate/ahead/tc.shtml)

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www.bom.gov.au/climate/ahead/tc.shtml) issue seasonal tropical cyclone outlooks. Both organizations are still calling for near average cyclone activity in all Australia sub-regions and in the South Pacific for the 2013-2014 cyclone season.

The PEAC tropical cyclone outlook for the upcoming western North Pacific typhoon season of 2014 is for near average activity, considering: (1) the anticipated movement of the climate system from ENSO-neutral early in the year towards an El Niño later in the year; and (2) the recent widespread trend toward reduced numbers of TCs. These two effects yield opposing results: a movement toward El Niño is favorable for a normal basin number of TCs and for pushing some typhoon development eastward into Micronesia; whereas, the ongoing trend indicates continued below normal activity with a westward displacement. Early season (March-June) typhoon activity is strongly related to ENSO, with years in which there is an onset of El Niño, seeing far more activity than during other climate scenarios.

The east of 160°E South Pacific annual cyclone total is typically 11. With only one cyclone noted in this area so far this year (Cyclone Ian), the cyclone count to-date is now below normal. With both BoM and NIWA anticipating slightly below normal cyclone activity in the South Pacific, the PEAC considers the risk of a damaging hurricane in American Samoa to be near average. This would mean the occurrence of one or two more named cyclones in the regional waters of American Samoa, Tonga and Fiji.

Super Typhoon Haiyan:

For the second time in just under a year, the Republic of Palau suffered the devastating effects of the close passage of a super typhoon (Fig. 4a and 4b). Last year (December 2012), Super Typhoon Bopha passed just south of the main islands of Babeldaob and Koror, and this year (November 2013) Super Typhoon Haiyan passed just north of these main islands, but with a direct strike to Kayangel, the island nation's northernmost atoll (Fig. 4b Eye Track).

Beginning as a tropical low at a very low latitude to the south of Pohnpei Island, Haiyan moved quickly westward at low latitudes in Micronesia, then made landfall close to the city of Tacloban in the Leyte province of the central Philippines. This cyclone became a super typhoon to the east of Palau. Once a Super Typhoon, Haiyan, passed North of Palau at approximately 3:00 am on November 7th with the eye wall of the storm passing directly over Kayangel. The National Weather Service reported maximum sustained winds of 160 mph at the storm's center with storm surge in excess of 20 ft. The rest of Palau also experienced damaging high winds and was under Typhoon Condition 1 from 7:00 pm, November 6th to 10:00 am November 7th, when the National Weather Service lifted the Typhoon Warning for the country. Kayangel received major damage to the structures and trees, but all 69 citizens who were on the island were accounted for and had no significant injuries. Koror, the most populous area of ...**Continued on Page 12**

¹ The PEAC tropical cyclone forecasts for 2013 are based on forecasts of the status of ENSO and input from three seasonal outlooks for tropical cyclone activity in the western North Pacific basin: (1) A statistical outlook prepared by Paul Stanko (a lead forecaster at the Guam WFO), (2) The City University of Hong Kong Laboratory for Atmospheric Research, under the direction of Dr. J. C-L. Chan, and (3) The Benfield Hazard Research Centre, University College London, Tropical Storm Risk (TSR) research group, UK, led by Dr Adam Lea and Professor Mark Saunders.

SEA SURFACE TEMPERATURES

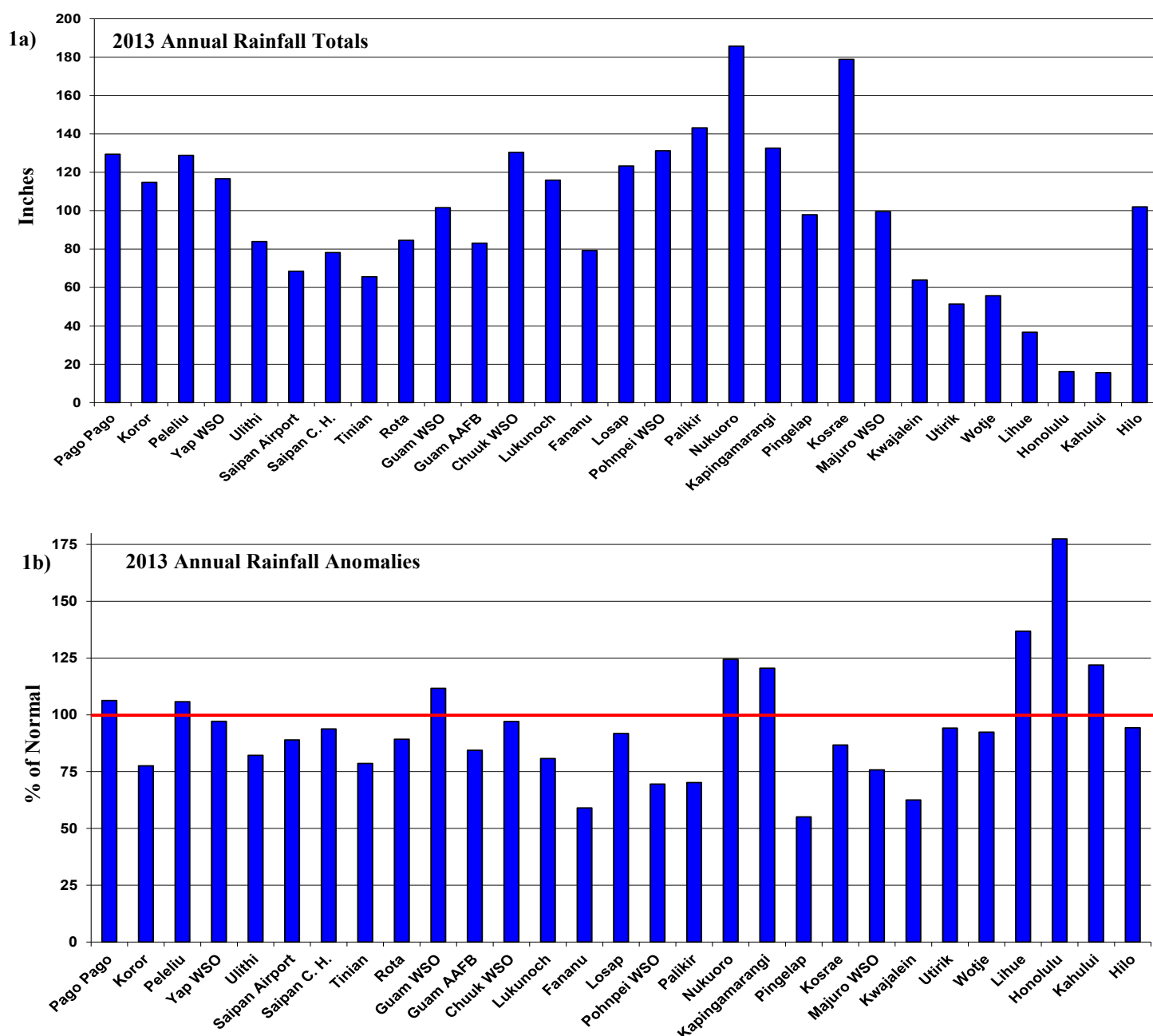
ENSO-neutral conditions continued during the OND 2013 season. This is represented by near average sea surface temperatures (SSTs) spanning across much of the equatorial Pacific. The Nino indices in all the regions were within ± 0.5 degrees C and reflected only small changes. The oceanic heat content fluctuated but remained above average. For October and November an oceanic Kelvin wave generated above average sub-surface temperatures. With the passing of the wave in December sub-surface temperatures are expected to return to average. Wind anomalies remained small while increasing later in the season. Convection was suppressed in the central Pacific and increased over Indonesia. These atmospheric and oceanic conditions reflect ENSO-neutral.

SOUTHERN OSCILLATION INDEX

The current 3-month average for the Southern Oscillation Index (SOI) for the 4th Quarter (October, November, and December) of 2013 was 0.2. The SOI has increased from a 2012 SOI of 0.0. The atmospheric conditions continue to reflect ENSO-Neutral. This was represented by the small wind anomalies and slightly above average oceanic heat content.

Normally, positive SOI values in excess of +1.0 are associated with La Niña conditions, and negative SOI values below -1.0 are associated with El Niño conditions. Low SOI values suggest a weak coupling between the ocean and the atmosphere. The SOI is an index representing the normalized sea-level pressure difference between Darwin, Australia and Tahiti, respectively.

Figure 1, below 2013 rainfall totals (a) in inches and (b) anomalies (expressed as % of normal). In 1b, solid line indicates normal rainfall (100%).



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American Samoa: The 2013 annual rainfall total at Pago Pago was 129.43 inches, which was slightly above average (106%). The roughly 8 inch surplus of annual rainfall was largely the result of a wet dry season that had a surplus of over 19 inches during the June through September heart of the dry season. During August, there was over 18 inches of rain at Pago Pago, which was 270% of the August long-term average. The 4th Quarter was drier than average, but an uptick in rainfall in late December 2013 into early January 2014 prompted flash flood warnings nearly every day, with reports of land slides and rock falls. The mean sea level remained higher than average at Pago Pago throughout 2013, with a deviation that was for many months of the year highest noted among the US-API sea level stations. Tropical cyclone activity in the South Pacific has been well below normal through late January 2014, with only one cyclone (Ian – TC 08P) developing near American Samoa.

American Samoa 4th Qtr and Annual Rainfall Summary 2013

Station		Oct.	Nov.	Dec.	4th Qtr	Annual
Pago Pago (WSO)	Inches	5.71	5.91	12.71	24.33	129.43
	% Avg	53%	55%	87%	67%	106%

Climate Outlook: American Samoa is now in the heart of its rainy season. Climate models and simple persistence of current conditions favor a continuation of near average rainfall over the next three-month period. The up coming dry season is anticipated to have a normal onset with near-average rainfall. Based on persistence of a relatively quiet tropics, and forecasts for slightly below average cyclone activity in the South Pacific; the risk of a damaging tropical cyclone in American Samoa is considered to be less than average, at 5-10% through April 2014. The possible onset of El Niño during late 2014 would provide an early and wet start to the rainy season, with an elevated risk of tropical cyclone formation near American Samoa.

Predicted rainfall for American Samoa from Jan 2014 through Dec 2014 are as follows:

Inclusive Period	% of long-term average / Forecast rainfall (inches) ¹
January - March 2014 (Heart of Rainy Season)	100% (37.31 - Pago Pago)
April - June 2014 (Onset of Next Dry Season)	100%
July - September 2014 (Heart of Next Dry Season)	100%
October - December 2014 (Onset of Next Rainy Season)	100%

¹ Forecast rainfall quantities represent BEST ESTIMATES given the probabilistic forecast for each particular season and station.



Guam/CNMI: Throughout Guam and the CNMI, the annual rainfall during 2013 was generally below average. An extreme rainfall event during mid-September on Guam pushed the annual totals above normal at some locations. From the 18th to

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the 22nd of September, upwards of 25 inches of rainfall was recorded at some locations on Guam. At AAFB and other locations on the north of Guam, the September event was not nearly as noticeable. Thus the AAFB annual total of 83.07 inches was substantially lower than at all the other Guam recording stations, located further south. The same weather systems responsible for the heavy September and October rainfall on Guam also affected the CNMI, but to a much lesser extent. After a very wet September and October, the final two months of the year ended up dry with persistent trade winds. By early January 2014, several small to medium-sized brush fires had scorched some of the grasslands of Guam's southern mountain region. Swell generated by strong extra-tropical cyclones pushing off the east coast of Asia caused high surf on the northern exposures of Guam and islands of the CNMI. Towards the end of December rough seas could be attributed to three deaths in the coastal waters of Guam.

During the 21st and 22nd of January 2014, there was an extreme 24-hour rainfall event on Guam. Widespread heavy rainfall of 5 to 6 inches was experienced across the island. The heavy showers were accompanied by a relatively rare display of lightning, for that time of year. This event was caused by a northward moving tropical disturbance that had been well forecast by the numerical guidance. Guam received the bulk of the heavy rainfall and at the same time set a daily record with 3.27 inches at the Guam International Airport.

Guam and CNMI 4th Qtr and Annual Rainfall Summary 2013

Station		Oct.	Nov.	Dec.	4th Qtr	Annual
GUAM						
GIA (WFO)	Inches	22.66	4.13	3.33	30.12	101.59
	% Norm	188%	50%	62%	118%	112%
AAFB	Inches	18.45	3.36	3.75	25.56	83.07
	% Norm	143%	37%	63%	91%	84%
Ugum Watershed	Inches	23.23	4.30	4.39	31.92	107.89
	% Norm	180%	47%	74%	114%	110%
Ypapao (Dededo)	Inches	23.89	3.70	4.09	31.68	111.66
	% Norm	185%	41%	69%	113%	113%
Sinajaña	Inches	22.20	4.87	4.42	31.49	104.81
	% Norm	184%	59%	82%	123%	115%
CNMI						
Saipan Intl. Airport	Inches	11.60	2.91	2.74	17.25	68.47
	% Norm	107%	50%	71%	84%	93%
Capitol Hill	Inches	17.57	1.99	3.21	22.77	78.21
	% Norm	146%	27%	67%	94%	94%
Tinian Airport	Inches	11.59	3.44	0.77	15.80	63.07
	% Norm	97%	47%	16%	66%	76%
Rota Airport	Inches	17.77	5.10	1.96	24.83	82.76
	% Norm	140%	59%	35%	92%	87%

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Climate Outlook: The dry season has begun on Guam and in the CNMI. November, December, and the first three weeks of January were drier than normal, but a recent record-setting extreme 24-hour rainfall event on Guam (and to a lesser extent on Saipan) has pushed January rainfall past its typical average rainfall at most Guam locations and at some locations in the CNMI. With computer guidance suggesting average rainfall during the 1st Quarter of 2014, and considering persistence of recent ongoing dry conditions, the official PEAC forecast issued in early January was for 1st Quarter rainfall to be average to below average throughout Guam and the CNMI. With January 2014 now certain to be wet on Guam and in the CNMI, and with near average rainfall still anticipated during February and March, it is now more likely that Guam and the CNMI will have near average 1st Quarter rainfall. If the climate system trends toward El Niño during the latter half of 2014, this would imply average to above average rainfall throughout Guam and the CNMI on into June. Also, during years that trend toward El Niño, there is typically above average tropical cyclone activity, with a big increase in the risk of a typhoon in the fall. The warmer sea surface temperature pattern of a developing El Niño starts the tropical cyclone season earlier, and moves the formation region of the cyclones eastward into Micronesia. Although no agency has yet produced guidance regarding the upcoming 2014 typhoon season, the PEAC would like to raise the awareness that Guam and the CNMI could see an elevated risk of a typhoon during 2014.

Predicted rainfall for the Mariana Islands from Jan 2014 through Dec 2014 are as follows:

Inclusive Period	% of long-term average / Forecast rainfall (inches) ¹	
	Guam/Rota	Saipan/Tinian
January – March 2014 (Heart of Dry Season)	125% (13.96 in)	125% (9.67 in)
April – June 2014 (End of Dry Season)	110%	110%
July - September 2014 (Heart of Next Rainy Season)	110%	110%
October - December 2014 (End of Next Rainy Season)	100%	100%

¹ Forecast rainfall quantities represent BEST ESTIMATES given the probabilistic forecast for each particular season and station.



Federated States of Micronesia

Yap State: Annual and 4th Quarter rainfall totals were just under 100% of average at most locations on Yap Island. On the outer islands of Ulithi and Woleai, the 4th Quarter rainfall and 2013 annual rainfall were lower than average. Over the past several months, the rainfall at three of the eight reporting sites on Yap Island have been persistently lower than at neighboring locations. Typically, all locations on Yap Island have similar quarterly and annual rainfall totals. Historically, we have not noted persistent differences in rainfall among the recording sites, but perhaps under certain weather patterns it is possible. Large differences of rainfall are noted at neighboring locations on many of the larger, more mountainous islands of Micronesia. Pohnpei Island is the most extreme case, with 155

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inches of annual rainfall along the north and east coasts, and 330 inches of annual rainfall in the high interior.

With near normal rainfall throughout most of 2013, there were no reports of any water shortages within Yap State. The weather was drier than normal for most of the year, with the exception of very heavy rainfall during September and October when the monsoon became active, and several tropical cyclones passed by the region. As Typhoon Haiyan passed well to the south of Yap Island on the 6th of November, the high tide rose 2 feet above the expected high tide, presumable from high surf on the eastern shores. The tide gauge at Colonia is exposed to effects of high waves from the southeast.

Several islands in Yap State, especially the more southern ones, experienced coastal flooding and erosion, and damages to trees and food crops. The most heavily affected island was Ngulu, which was placed into a Typhoon Warning 24 hours before the onset of damaging winds. The six residents of Ngulu rode out the storm in an old Japanese weather building. The storm passed to within 40 miles of Ngulu, where the surge washed over the islets of the atoll and the strong Category 3 typhoon-force winds damaged or destroyed many trees and all agriculture.

Yap State 4th Qtr and Annual Rainfall Summary 2013						
Station		Oct.	Nov.	Dec.	4th Qtr	Annual
Yap Island						
Yap WSO	Inches	17.60	6.56	5.56	29.72	116.62
	% Avg	147%	72%	62%	99%	97%
Dugor	Inches	16.50	6.42	6.09	29.01	117.91
	% WSO*	138%	71%	68%	97%	98%
Gilman	Inches	5.87	2.53	2.47	10.87	69.49
	% WSO*	49%	28%	27%	36%	58%
Luweech	Inches	8.39	1.23	7.31	16.93	94.45
	% WSO*	70%	14%	81%	56%	79%
Maap	Inches	8.67	5.98	2.00	16.65	77.80
	% WSO*	72%	66%	22%	55%	65%
North Fanif	Inches	13.08	6.60	5.88	25.56	113.39
	% WSO*	109%	73%	65%	85%	94%
Rumung	Inches	16.13	6.82	6.08	29.03	110.91
	% WSO*	135%	75%	68%	97%	92%
Tamil	Inches	16.51	6.05	5.27	27.83	112.95
	% WSO*	138%	67%	59%	93%	94%
Outer Islands						
Ulithi	Inches	12.53	6.90	4.60	24.03	83.89
	% Avg	123%	89%	60%	94%	82%
Woleai	Inches	3.58	6.35	6.80	16.73	103.25
	% Avg	26%	59%	59%	47%	74%

* With Respect to the normal values at the Yap WSO.

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Climate Outlook: With a wet January in-progress and with computer guidance suggesting above average rainfall, the outlook for Yap State is for average to above average rainfall to occur for at least the next three months and probably through September or October. If El Niño develops in the latter half of 2014, then it is possible for persistent dryness to set-in very late in the year around November or December of 2014. The chances for gale-force winds or greater from a tropical cyclone near Yap Island or any of the northern outer islands will be above average during all of 2014, especially if the climate system trends to El Niño during the year.

Predicted rainfall for Yap State from Jan 2014 through Dec 2014 are as follows:

Inclusive Period	% of long-term average / Forecast rainfall (inches) ¹	
	Southern Is.	Yap & Northern Is.
January – March 2014 (Heart of Dry Season)	100% (26.48 in)	120% (22.59 in)
April – June 2014 (Onset of Rainy Season)	100%	120%
July – September 2014 (Heart of Next Rainy Season)	100%	120%
October – December 2014 (End of Next Rainy Season)	90%	90%

¹ Forecast rainfall quantities represent BEST ESTIMATES given the probabilistic forecast for each particular season and station.

Chuuk State: The 2013 annual rainfall was near average throughout much of Chuuk State. The northern atolls, represented by Fananu and Onoun were persistently dry during 2013, while Chuuk Lagoon and the atolls of the Mortlock island groups had a mix of wet and dry months; that summed to only slightly drier or near average for the yearly total. During the first half of 2013, some of the northern atolls including Namonuito and the Hall Islands were dry enough to cause concerns for water supplies. The northern and western atolls of Chuuk State were included in the early Drought Information Statements issued by the WFO Guam. During December 2013, through mid January 2014, the northern atolls of Chuuk State became unusually dry once again and had reports of water shortages developing. Recent rainfall in the latter half of January 2014, however, has eased concerns of water shortages in these atolls. Rainfall was particularly abundant throughout Chuuk State during September through early November, when the western Pacific basin became very active with respect to tropical cyclone formation. Several of the basin's active output of tropical cyclones formed within the boundary of Chuuk State, or passed though Chuuk State in their early stages of development. In early November, the notorious Super Typhoon Haiyan became a tropical storm within Chuuk State, while on its westward track toward Palau. Several islands in Chuuk State were placed into a Tropical Storm Warning. However, during Haiyan's trek through the southern portions of Chuuk State, the storm stayed just far enough south to spare the islands and atolls from significant damage.

During an extended period from the 1st through the 6th of December 2013, some minor coastal inundations were reported

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on the northern islands at times of high tides in combination with high trade winds.

Chuuk State 4th Qtr and Annual Rainfall Summary 2013						
Station		Oct.	Nov.	Dec.	4th Qtr	Annual
Chuuk Lagoon						
Chuuk WSO	Inches	11.82	11.82	8.44	32.08	130.37
	% Avg	88%	114%	78%	93%	97%
Piis Panew	Inches	9.84	9.71	7.64	27.19	97.25
	% WSO*	73%	94%	70%	79%	72%
Western Atolls						
Polowat	Inches	8.79	6.35	9.99	25.13	90.72
	% Avg	73%	69%	109%	83%	75%
Northern Atolls						
Fananu	Inches	9.38	5.94	6.80	22.12	79.27
	% WSO*	70%	57%	63%	64%	59%
Onoun	Inches	13.23	10.40	7.40	31.03	94.13
	% WSO*	99%	101%	68%	90%	70%
Northern Mortlocks						
Losap	Inches	16.71	9.66	5.19	31.56	123.26
	% WSO*	124%	93%	48%	91%	92%
Nama	Inches	8.65	12.07	6.31	27.03	121.18
	% WSO*	64%	117%	58%	78%	90%
Southern Mortlocks						
Lukunoch	Inches	13.34	11.38	10.11	34.83	115.93
	% Avg	129%	104%	79%	102%	81%
Ettal*	Inches	12.93	10.20	6.49	29.62	119.37
	% Luk**	125%	93%	50%	87%	83%
Ta*	Inches	16.21	12.45	9.81	38.47	138.67
	% Luk**	156%	114%	76%	113%	97%
Namoluk	Inches	10.42	11.88	9.43	31.73	131.40
	% Luk**	100%	109%	73%	93%	92%

* With respect to WSO normals, ** with respect to Lukunoch normals.

Climate Outlook: Computer guidance, and considerations of the possible movement of the climate state from ENSO-neutral to El Niño during 2014, indicate that all atolls of Chuuk State should have average to above average rainfall for most months of 2014 (notwithstanding the recent dry spell in the northern atolls from December through mid January). A sure sign of an impending El Niño is an early onset of heavy rainfall in the spring accompanied by anomalous westerly winds and early tropical storm formation. These anomalies are not only a sign of impending El Niño, but help to bolster confidence in the forecasts associated with an incipient El Niño. Throughout 2014, there will likely be an average to above average chance for a tropical storm or typhoon to pass through some part of Chuuk State.

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Predictions for Chuuk State from Jan 2014 through Dec 2014 are as follows:

Inclusive Period	% of long-term average / Forecast rainfall (inches) ¹			
	Chuuk Lagoon, Losap, and Nama	Polowat	Northern Atolls and Islands	Southern Mortlocks
Jan – Mar 2014	110% (25.77 in)	95% (24.48 in)	95% (24.48 in)	120% (30.91 in)
Apr – Jun 2014	120%	100%	100%	120%
Jul – Sep 2014	110%	100%	120%	110%
Oct – Dec 2014	100%	95%	100%	100%

¹ Forecast rainfall quantities represent BEST ESTIMATES given the probabilistic forecast for each particular season and station.

Pohnpei State: Annual rainfall was below average across Pohnpei Island and the northern Pingelap, Mokil and Oroluk) atolls of Pohnpei State during 2013. The rainfall at the Pohnpei Weather Service Office (WSO) was below normal for 11 of the 12 months, during 2013. The distribution of rainfall on Pohnpei Island was also unusual, with the typically wetter Palikir falling behind both the WSO and the Airport. By contrast, it was very wet at atolls located near the equator, Nukuoro and Kapingamarangi. In fact, the monthly rainfall totals at Nukuoro were above average for the 11 months mentioned above. At Kapingamarangi, half of the months of 2013 had above average rainfall, but two of the wet months, March and December, had particularly heavy rainfall, with these two months alone accounting for over one-third of the 2013 annual total. It has been continually very wet at Nukuoro and Kapingamarangi since a major drought broke in June 2011. Dryness across Pohnpei Island and the northern atolls, has not resulted in any reported problems with the water supply. Large 16 to 18 feet surf occurred from the 7th to the 9th of December, but there were no reports of any damaging inundation in either of these events.

Pohnpei State 4th Qtr and Annual Rainfall Summary 2013						
Station		Oct.	Nov.	Dec.	4th Qtr	Annual
Pohnpei Island						
Pohnpei WSO	Inches	12.37	20.99	5.79	39.15	131.21
	% Norm	74%	133%	38%	82%	70%
Palikir	Inches	12.87	8.10	8.87	29.84	133.16
	% WSO*	71%	48%	54%	58%	65%
Kolonia Airport	Inches	13.50	16.42	9.94	39.86	142.64
	% WSO*	98%	127%	80%	102%	92%

* With respect to WSO normals.

LOCAL SUMMARY AND FORECAST

Pohnpei State 4th Qtr and Annual Rainfall Summary 2013						
Station		Oct.	Nov.	Dec.	4th Qtr	Annual
Atolls of Pohnpei State						
Nukuoro	Inches	9.52	13.00	16.92	39.44	185.73
	% Norm	89%	108%	141%	113%	124%
Pingelap	Inches	8.91	8.31	4.37	21.59	97.90
	% Norm	60%	58%	33%	51%	55%
Mwoakil-loa	Inches	17.05	13.32	5.87	36.24	122.93
	% Norm	124%	103%	47%	93%	79%
Kapingamarangi	Inches	6.99	3.49	25.02	35.50	132.61
	% Norm	145%	43%	286%	163%	121%

* With respect to WSO normals.

Climate Outlook: Pohnpei Island was dry during 2013, and there is a long-term drying trend in the historical record of rainfall at the Pohnpei WSO. A forecast based on a persistence of recent dryness and the long-term trend would favor continued dryness at Pohnpei Island and the northern atolls. However, computer guidance and a shift of the climate system toward El Niño during 2014 favor above average rainfall at these locations for most of 2014. The consensus at the PEAC is to base the forecast on the computer guidance and the anticipated shift of the status of ENSO. Thus, the forecast for the next few months and indeed for most of 2014 is for average to above average rainfall to occur throughout Pohnpei State. Unless it is El Niño, tropical storms and typhoons do not typically affect Pohnpei State. With El Niño possibly developing during the latter half of 2014, the risk of a tropical cyclone affecting Pohnpei State will be higher than during the past several years. Note: The risk of a tropical cyclone affecting Pohnpei State also rises during the spring months of late March through early June of years that trend toward El Niño; even before the ENSO indexes indicate El Niño is occurring. In this sense, the formation of a tropical cyclone near Pohnpei in the spring is as much an indicator and a harbinger of El Niño.

Predicted rainfall for Pohnpei State from Jan 2014 through Dec 2014 are as follows:

Inclusive Period	% of long-term average / Forecast rainfall (inches) ¹	
	Pohnpei Island and Atolls	Kapingamarangi
Jan - Mar 2014	110% (37.32 in)	110%(54.36 in)
Apr - Jun 2014	120%	120%
Jul - Sep 2014	110%	100%
Oct - Dec 2014	100%	110%

¹ Forecast rainfall quantities represent BEST ESTIMATES given the probabilistic forecast for each particular season and station.

LOCAL SUMMARY AND FORECAST

Kosrae State: The 2013 annual rainfall on Kosrae was below normal at 3 of the 4 rain-recording sites on the island. Kosrae is roughly circular with dimensions of 6 by 8 miles. Each of the four rain-recording sites are located at coastal locations; with the airport on the northwest coast, Tofol and the Nautilus Hotel on the east coast, and Utwa on the south coast. There is no 1 Kosrae site that consistently has more or less rain than any other site. During most of the months of 2013, Utwa was wetter than any other locations, particularly during June. All precipitation averages for Kosrae are based on the long-term historical records from the airport. It is likely that the interior highlands of the island receive much more rain than the coastal locations, but no rain measurements have ever been made there. Rainfall estimates made by the Oregon State University's PRISM Climate Group for the island of Kosrae indicate annual rainfall near 260 inches in Kosrae's central highlands. A nice color map of the isohyets of Kosrae annual rainfall can be found at: http://oldprism.nacse.org/products/viewer.phtml?vartype=ppt&month=14&file=/pub/prism/pacisl/graphics/ppt/Normals/kosrae_ppt_1971_2000.14.png. Kosrae, along with other locations in the eastern portion of Micronesia, has had a statistically significant long-term trend of decreasing rainfall. During December 2013, high surf was observed on Kosrae, but there were no reports of damaging sea inundation. Through mid January 2014, 4.31 inches of rainfall was observed, which is on a below normal pace for Kosrae.

Kosrae State 4th Qtr and Annual Rainfall Summary 2013						
Station		Oct.	Nov.	Dec.	4th Qtr	Annual
Airport (SAWRS)	Inches	22.03	15.54	13.94	51.51	178.83
	% Avg	136%	98%	96%	111%	87%
Utwe	Inches	16.97	19.03	13.20	49.20	208.98
	% SWR*	105%	120%	91%	106%	101%
Tofol	Inches	13.40	12.60	12.20	38.20	154.75
	% SWR*	83%	79%	84%	82%	75%
Nautilus Hotel	Inches	14.18	11.97	11.56	37.71	162.98
	% SWR*	88%	75%	80%	81%	79%

*SAWRS(SWR) means Supplementary Aviation Weather Reporting Stations

Climate Outlook: Computer guidance suggests that Kosrae (along with most of the islands and atolls of nearby Pohnpei State) will have above average rainfall for at least the next 3 months. A consideration of persistence of recent dryness and the long-term drying trend would temper this forecast. As a compromise, the PEAC forecast calls for average to slightly above average rainfall at Kosrae for at least the next three months. If El Niño develops during 2014, one would anticipate average to above-average rainfall in Kosrae for most of 2014. Tropical cyclones rarely affect Kosrae, but the risk is much higher during El Niño than during other states of the Pacific basin climate. A notorious typhoon that is now referred to as the "black typhoon" struck Kosrae during April 19th to the 22nd of 1905. Stories of that event suggest that the sun was not seen for a week and the day was as dark as night. During this event it was

LOCAL SUMMARY AND FORECAST

told that the locals sought shelter in the mountains. Nearly total defoliation turned the island black. The climate state of the Pacific during the year 1905 was a strong El Niño.

Predicted rainfall for Kosrae State from Jan 2014 through Dec 2014 are as follows:

Inclusive Period	% of long-term average / Forecast rainfall (inches) ¹
January – March 2014	100% (49.41 in)
April – June 2014	110%
July – September 2014	100%
October – December 2014	100%

¹ Forecast rainfall quantities represent BEST ESTIMATES given the probabilistic forecast for each particular season and station.



Republic of Palau: Super Typhoon Haiyan was the major event of the year for Palau. Other than the strike by this super typhoon, the climate and weather was relatively unremarkable during 2013. Heavy rainfall during from the 25 to the 27 of June caused flooding in parts of the main island of Babeldaob and landslides along the Compact Road that rings the island. Also, during June, very high tides were observed during the time of the full moon. These high tides flooded some yards and homes and covered a floating dock. Annual rainfall was below normal, particularly at the Koror Weather Service Office (WSO) where the rainfall was below normal for 10 of 12 months. Of course, the main weather story of the year was the passage of Super Typhoon Haiyan through the area during early November. This is described in more detail in the Super Typhoon Haiyan section.

Republic of Palau 4th Qtr and Annual Rainfall Summary 2013						
Station		Oct.	Nov.	Dec.	4th Qtr	Annual
Koror (WSO)	Inches	10.19	13.11	7.19	30.49	114.78
	% Norm	73%	116%	60%	82%	78%
Nekken	Inches	10.06	12.93	11.20	34.19	129.01
	% Norm	73%	114%	93%	92%	87%
Intl. Airport	Inches	12.50	14.53	7.53	34.56	145.15
	% Norm	90%	128%	63%	93%	98%
Peleliu	Inches	7.47	13.09	13.15	33.71	134.96
	% Norm	54%	116%	110%	91%	91%

Climate Outlook: Computer models indicate above average rainfall throughout the Republic of Palau for at least the next three months. This is consistent with a high likelihood of El Niño developing in the latter half of 2014. The threat of yet another typhoon affecting Palau is typically reduced late in the year by El Niño, since the formation region of tropical cyclones is drawn eastward. Tropical cyclone outlooks have not fared well lately, with the 2013 forecasts of Atlantic hurricane activity considered to have failed, and the recent decadal trend of the Pacific basin to overall lower activity has complicated the statistical relationships between typhoon activity and other weather patterns.

LOCAL SUMMARY AND FORECAST

Predicted rainfall for Palau from Jan 2014 through Dec 2014 are as follows:

Inclusive Period	% of long-term average / Forecast rainfall (inches) ¹
January – March 2014	110% (32.60 in)
April – June 2014	120%
July - September 2014	110%
October - December 2014	100%

¹ Forecast rainfall quantities represent BEST ESTIMATES given the probabilistic forecast for each particular season and station.



Republic of the Marshall Islands: The big story of 2013 within the Republic of the Marshall Islands (RMI) was the extraordinary dryness at Wotje, Utirik, and several other northern islands during a 7 month period from November 2012 through May 2013. This severe drought affected over 6,300 people. On 14 June, U.S. President Barack Obama issued a Presidential Disaster Declaration for the RMI, authorizing additional U.S. Government funding for relief and reconstruction activities. Abundant rainfall during September and November helped to bring the annual rainfall at both of these atolls close to average.

Ironically, while 4th Quarter rainfall totals were actually above average at Wotje and Utirik, most other locations throughout the RMI had below average 4th Quarter rainfall. The 63.83 inches of annual rainfall at Kwajalein made 2013 the 2nd driest year in its 6 ½ decade time series. December 2013 was very dry across all of the RMI, and January 2014 continued the dry spell at most locations. On Majuro, rain catchments had run dry by early January, and the 33 million gallon airport reservoir had fallen to half-capacity, leading to a 3 days per week water rationing. Kwajalein was making preparations for drought conditions, but on the 26th of January, Kwajalein got a brief respite with 2.38 inches of rainfall. This one day rainfall event should bring Kwajalein's January monthly rainfall total to near average. Note, that nearly all the islands of eastern Micronesia (and also Hawaii) have long-term downward trending time series of annual rainfall.

During 2013, the RMI was the site of another severe impact from unusual climatic conditions. On the 25th of June, and for a day or two before and after, the tides were unusually high. These high tides were combined with a long-period of 4 to 6 foot oceanic swell from the south. Damaging seas inundated the southern facing reefs of Majuro. The mean sea level remains above average in the RMI by about 5 to 6 inches.

RMI 4th Qtr and Annual Rainfall Summary 2013						
Station		Oct.	Nov.	Dec.	4th Qtr	Annual
RMI Northern Atolls						
Kwajalein	Inches	4.17	13.63	2.62	20.42	63.83
	% Avg	35%	128%	32%	67%	63%
Wotje	Inches	8.41	13.22	1.28	22.91	55.65
	% Avg	101%	193%	29%	117%	92%
Utirik	Inches	5.64	12.08	0.49	18.21	51.32
	% Avg	37%	13%	22%	25%	41%

LOCAL SUMMARY AND FORECAST

RMI 4th Qtr and Annual Rainfall Summary 2013						
Station		Oct.	Nov.	Dec.	4th Qtr	Annual
RMI Central and Southern Atolls						
Majuro WSO	Inches	9.01	12.84	5.76	27.61	99.56
	% Avg	65%	100%	49%	72%	76%
Laura	Inches	13.03	16.60	7.51	37.14	128.05
	% Avg	94%	130%	63%	96%	97%
Mili	Inches	10.75	18.27	9.10	38.12	147.66
	% Avg	78%	143%	77%	99%	112%
Ailing-laplap	Inches	7.75	13.26	4.43	25.44	77.64
	% Avg	60%	113%	44%	74%	67%
Jaluit	Inches	4.04	9.02	2.89	15.95	84.92
	% Avg	29%	70%	24%	41%	65%
Arno	Inches	9.93	16.79	4.21	30.93	99.95
	% Avg	72%	131%	36%	80%	76%

*All averages for central and southern atolls are with respect to the averages at the WSO.

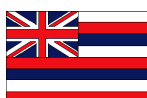
Climate Outlook: Computer guidance suggests that the rainfall in the RMI will be near average to above average in the RMI over the next 3 months. The persistence of recent dry weather, a lack of rain-producing weather patterns, and a consideration of the long-term trend led the PEAC to trim the JFM 3 month rainfall forecast for Kwajalein from near average to below average, and the JFM 3 month rainfall forecast for Majuro and nearby atolls to near average. The central and northern atolls of the RMI are now entering their dry seasons, and even with near average rainfall there could be some problems with potable water quantity in Majuro, Kwajalein, and the Wotje and Utirik atolls of the RMI through May 2014. At this time, the Weather Forecast Office on Guam has a Drought Information Statement out for the northern islands of the RMI.

If El Niño develops during 2014, there is a small chance that a developing tropical cyclone could affect Kwajalein and the other islands north of Majuro in the September to December time-frame.

Predicted rainfall for the RMI from Jan 2014 through Dec 2014 are as follows:

Inclusive Period	% of long-term average / Forecast rainfall (inches) ¹		
	South of 6°N	6°N to 9°N	North of 9°N
Jan – March 2014	100% (23.38 in)	90% (21.04 in)	75% (9.5 in)
April – June 2014	100%	95%	90%
July – Sept 2014	100%	100%	95%
Oct – Dec 2014	100%	110%	100%

¹ Forecast rainfall quantities represent BEST ESTIMATES given the probabilistic forecast for each particular season and station.



Hawaii: October... Continued on Page 12

Seasonal Sea-Level Outlook for the US-Affiliated Pacific Islands

The following sections describe: (i) the Canonical Correlation Analysis (CCA) forecasts for seasonal (mean and maxima) sea-level anomalies (seasonal cycle removed) for the forthcoming seasons January-February-March (JFM), February-March-April (FMA), and March-April-May (MAM) of 2014, and JFM return values at 20 and 100-yr period, (ii) the observed monthly mean and maximum sea-level anomalies for the previous season OND 2013, and (iii) Seasonal sea level variability (Comparison of SST and SST-Wind (U)-based forecasts). Note that, seasonal cycles have been removed for the data anomalies that are defined as ‘deviations or departures from the normal’, using the 1983 through 2001 mean sea level value computed at each station. Also note, that CCA-forecasting technique adopted here do not account for sea-level deviations created by other atmospheric or geological factors such as tropical cyclones, storm surges or tsunamis.

(i) Seasonal sea level forecast (anomalies with respect to climatology) for JFM, FMA, and MAM of 2014

Forecasts of the sea-level anomalies in the USAPI (see <http://www.prn.noaa.gov/peac/map.php>) are presented using CCA statistical model. Based on the independent SST and zonal wind (U) (SST-U) values in OND 2013, the resulting CCA model has been used to forecast the sea-level of three consecutive seasons: JFM, FMA, and MAM (see Table 1: left panel shows values for seasonal mean while the right panel shows the seasonal maxima). All the tide gauge stations (at 0 to 2-months lead time) show skillful forecasts for these three consecutive seasons (Table 1: bottom panel). The CCA cross-validation focus for mean and max sea level has been found to be skillful with an average skill level of 0.72.

Table 1: Forecasts of sea level anomalies in inches (JFM, FMA, and MAM)

Tide Gauge Station	Seasonal Mean Deviations ¹				Seasonal Max Deviations ²					
	JFM	FMA	MAM	Forecast Quality ³	JFM	FMA	MAM	Forecast Quality ³	Return Period ⁴ for JFM Season	
Lead Time ⁵	0	1M	2M		0	1M	2M		20 Year	100 Year
Marianas, Guam	+4	+4	+4	V. Good	+20	+20	+20	V. Good	5.6	6.7
Malakal, Palau	+3	+3	+2	Good	+40	+40	+38	Good	9.6	14.3
Yap, FSM	+3	+3	+3	V. Good	+32	+33	+33	V. Good	16.7	33.0
Chuuk, FSM**	+3	+3	+3	N/a	+32	+32	+32	N/a	n/a	n/a
Pohnpei, FSM	+4	+3	+3	V. Good	+34	+32	+31	V. Good	5.8	7.1
Majuro, RMI	+3	+2	+2	V. Good	+44	+43	+42	Fair	4.1	5.1
Kwajalein, RMI	+4	+3	+3	V. Good	+43	+42	+41	V. Good	4.5	5.9
Pago Pago, Am. Samoa	+4	+4	+4	V. Good	+28	+28	+27	V. Good	3.9	5.4
Honolulu, Hawaii	+1	+1	+1	Poor	+19	+19	+19	Poor	4.1	5.9
Hilo, Hawaii	+1	+1	+1	Poor	+23	+23	+23	Poor	7.9	11.4

Note: (-) indicates negative anomalies (fall of sea level from the mean), and (+) indicates positive anomalies (rise of sea level from the mean), n/a: data not available. Anomalies from -1 to +1 inches are considered negligible and anomalies from -2 to +2 inches are unlikely to cause any adverse climatic impact. Forecasts for Chuuk (**) are estimated subjectively based on information from WSO Chuuk and observations from neighboring stations of Pohnpei and Yap. For the explanation of footnotes 1 through 5 see <http://www.prh.noaa.gov/peac/footnote.php>. Also note, that all information is based on 1983-2001 epoch.

Remarks: The forecasts values of sea level for JFM, FMA, and MAM seasons (Table 1, above) indicate that most of the stations in the north Pacific region are likely to be 3-4 inches higher than normal in the forthcoming seasons. In Hawaii, both Honolulu and Hilo are likely to be closer to normal during the same time period. The overall conditions indicate the continuation of an ENSO-neutral stage. The wind anomalies remain small at lower and upper levels. Equatorial convection was suppressed in the central equatorial Pacific and enhanced over Indonesia. The SST anomalies are near average across much of the equatorial Pacific Ocean. As a result, ENSO-neutral condition is likely to continue and sea level will fall as the season advances; but will still remain slightly elevated during the forthcoming seasons.

(ii) Observed monthly sea level anomalies in OND, 2013

The monthly time series (October to November) for sea level anomalies have been taken from the University of Hawaii Sea Level Center. The full time series (in mm) for monthly mean is available at: <http://ilikai.soest.hawaii.edu/uhscl/woce.html>. Locations of all stations can be found at <http://www.prn.noaa.gov/peac/map.php>.

Seasonal Sea Level Outlook for the US-Affiliated Pacific Islands

Table 2: Monthly observed mean/max sea-level anomalies in inches

Tide Gauge Station	Monthly Mean Deviations ¹				Monthly Max Deviations ²			
	Oct	Nov	Dec	Standard Deviations	Oct	Nov	Dec	Standard Deviations
Marianas, Guam	4.1	+4.8	+7.1	+5.9	3.6	+20	+22	+23
Malakal, Palau	4.4	+5.2	+4.7	+6.6	4.5	+42	+42	+44
Yap, FSM	4.7	+4.2	+5.0	+6.7	4.8	+30	+51**	+35
Chuuk, FSM*	*							
Pohnpei, FSM	4.7	+6.1	+7.1	*	4.9	+34	+37	*
Majuro, RMI	3.5	+2.7	+5.5	*	3.9	+39	+45**	*
Kwajalein, RMI	3.7	+5	+5	+6.7	3.8	+40	+42	+48
Pago Pago, American Samoa	2.8	+8.4	+8.2	+7.1	3.1	+30	+30	+32
Honolulu, Hawaii	1.7	+2.4	+1	+0.2	2.5	+18	+19	+21
Hilo, Hawaii	1.8	+1	+1	+2.8	2.2	+20	+22	+27

* Denotes data currently unavailable. 1: Difference between the mean sea level for the given month and the 1983 through 2001 mean sea level value at each station (seasonal cycle removed). 2: Same as 1 except for maxima; SD stands for standard deviations. ** Impact of Typhoon Haiyan. Also see footnotes of Table 1.

Remarks: As compared to November, the monthly mean sea level anomaly in December 2013 shows rises in Palau, Yap, and Kwajalein. Slight fall was observed in Guam and Pago Pago. Honolulu remained static; however, Hilo recorded a rise. Currently, all North Pacific stations are 4-7 inches higher than normal, the lone South Pacific station is 7 inches higher than normal, Honolulu is close to normal, and Hilo is about 3 inches higher than normal.

(iii) Seasonal Sea Level Variability: Comparison of SST and SST-U-based forecasts

PEAC has recently started to generate SST-Wind-based forecast. Our findings have revealed that the combined SST and zonal wind (U)-based forecasts are more skillful than the SST-based forecasts alone. The average skill of a 0-3 seasons lead forecast for seasons: JFM, AMJ, JAS, and OND are as follows 0.638, 0.684, 0.664, and 0.604 respectively (Fig. 3). These forecasts are 6, 18, 7, and 2.5 percent higher than the similar SST-based forecasts. Among the four seasons, SST-Wind of AMJ and JAS exhibit the highest skill. AMJ provides 18 and 26 percent better forecasts on 2- and 3-season lead time. JAS provides a 10 and 12 percent forecast improvement on the same seasonal time-scale. These results suggest that the addition of U significantly improves the sea level predictability of AMJ and JAS on longer time-scales.

Figure 3: Comparison of SST and SST-Wind(U) based forecasts

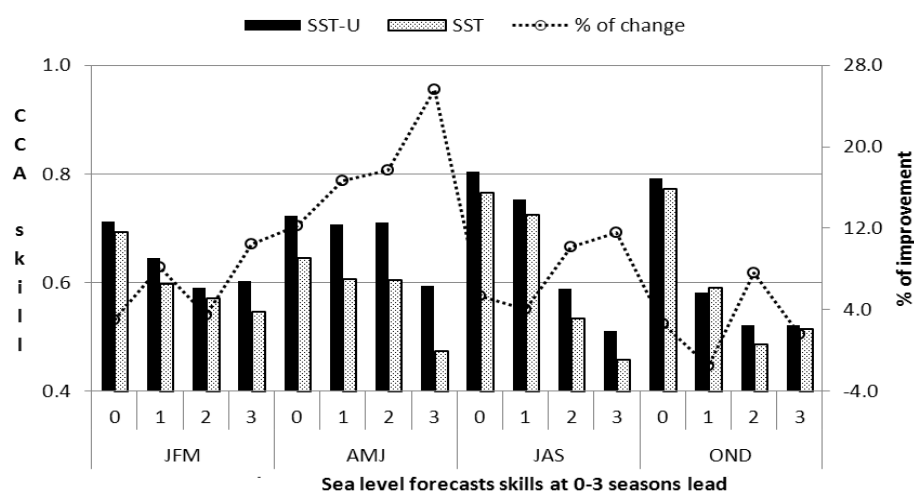


Figure 1: Comparison of SST and SST-Wind (U)-based sea-level forecasts. Average forecast skills for all seven USAPI stations for seasons: JFM, AMJ, JAS, and OND at 0-3 seasons-lead. The percent of improvement is represented by the dotted line.

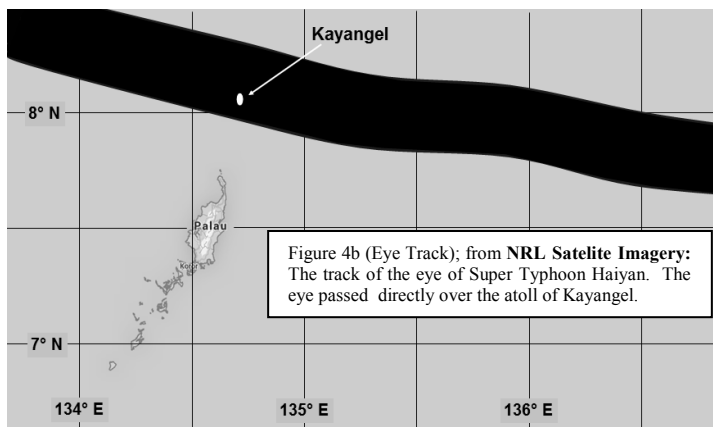
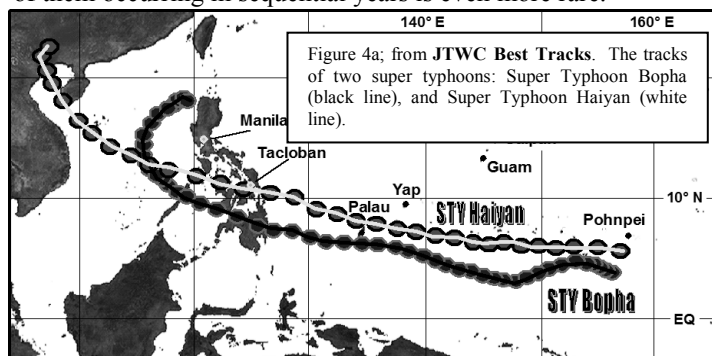
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TROPICAL CYCLONE

Continued from page 2... Palau, experienced relatively minor damages. Low-latitude intense typhoons are relatively rare; two of them occurring in sequential years is even more rare.



LOCAL SUMMARY AND FORECAST

Continued from page 9 ...usually marks the onset of the rainy season for the Hawaiian Islands. The October November December (OND) 2013 season saw a few heavy rainfall events that caused flooding and damages. Of greatest impact was the rainfall on Dec 29th to the 30th in which an upper level trough moved over remnant frontal moisture from a previous frontal passage and initiated thunderstorms over the Big Island. Unfortunately these heavy rains missed the areas of the Big Island most severely affected by drought.

State of Hawaii 4th Qtr and Annual Rainfall Summary 2013

Station		Oct.	Nov.	Dec.	4th Qtr	Annual
Lihue Airport	Inches	7.99	3.87	5.28	17.14	36.71
	% Norm	242%	110%	167%	171%	137%
Honolulu Airport	Inches	0.18	1.95	3.64	5.77	16.18
	% Norm	14%	143%	276%	146%	177%
Kahului Airport	Inches	0.04	4.64	2.04	6.72	15.63
	% Norm	7%	252%	77%	133%	122%
Hilo Airport	Inches	6.80	6.66	20.20	33.66	101.99
	% Norm	79%	59%	197%	111%	94%

Climate Outlook: The U.S. Climate Prediction Center's Seasonal Outlook Discussion, posted on January 16, 2014, can be obtained from the following website: <http://www.cpc.ncep.noaa.gov/products/predictions/90day/hw40.html>.

ACKNOWLEDGEMENTS AND FURTHER INFORMATION

Pacific ENSO Applications Climate (PEAC) Center:
HIG #340, 2525 Correa Road, Honolulu, Hawai'i 96822
LTJG G. Carl Noblitt IV, Pacific Region Climate Officer, at 808-956-2324: for information on PEAC, the Pacific ENSO Update and ENSO-related climate data for the Pacific Islands.
Dr. Rashed Chowdhury, Principal Research Scientist, at 808-956-2324: for information on ENSO and sea-level variability in the USAPI.

Alejandro Ludert, Graduate Research Assistant and Webmaster, at 808-956-2324 for: information related to the PEAC website.

University of Hawai'i - Joint Institute of Marine and Atmospheric Research (JIMAR), School of Ocean and Earth Science and Technology (SOEST), Department of Oceanography:

MSB #317, 1000 Pope Road, Honolulu, Hawai'i 96822
Dr. Mark Merrifield, PEAC Principal Investigator at 808-956-6161: for more information on sea level and climate in Hawai'i.

**NOAA National Weather Service
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**NOAA National Weather Service
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3232 Hueneme Road, Barrigada, Guam, 96913
Chip Guard, Warning Coordination Meteorologist, at 671-472-0900: for information on tropical cyclones and climate in the USAPI.

University of Guam - Water and Environmental Research Institute (WERI):
UOG Station, Mangilao, Guam 96913
Dr. Mark Lander, PEAC Meteorologist, at 671-735-2685 for: information on tropical cyclones and climate in the USAPI.

The Pacific ENSO Update is a bulletin of the Pacific El Niño-Southern Oscillation (ENSO) Applications Climate (PEAC) Center. PEAC conducts research & produces information products on climate variability related to the ENSO climate cycle in the U.S. Affiliated Pacific Islands (USAPI). This bulletin is intended to supply information for the benefit of those involved in such climate-sensitive sectors as civil defense, resource management, and developmental planning in the various jurisdictions of the USAPI.

The Pacific ENSO Update is produced quarterly both online and in hard copy, with additional special reports on important changes in ENSO conditions as needed. For more information about this issue please contact the editor, LTJG G. Carl Noblitt IV, at peac@noaa.gov or at the address listed below.

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